Maryland Historical Trust

Maryland Inventory of Historic Properties Number: CAR-299

Name: #CO-0027/Double Hill Rd over Walts Creek

The bridge referenced herein was inventoried by the Maryland State Highway Administration as part of the Historic Bridge Inventory, and SHA provided the Trust with eligibility determinations in February 2001. The Trust accepted the Historic Bridge Inventory on April 3, 2001. The bridged received the following determination of eligibly.

MARYLAND HISTORICAL TRUST

Eligibility Recommended _____ Eligibility Not Recommended ___X___

Criteria: ____A ____B ____C ____D Considerations: ___A ___B ___C ___D ___E ___F ___G __None

Comments:_____

_____

_____

Reviewer, OPS:__Anne E. Bruder_____ Date:__3 April 2001_____

Reviewer, NR Program:_Peter E. Kurtze_____ Date:___3 April 2001_____

MARYLAND INVENTORY OF HISTORIC BRIDGES **MHT No.** CAR- 299
HISTORIC BRIDGE INVENTORY
MARYLAND STATE HIGHWAY ADMINISTRATION/
MARYLAND HISTORICAL TRUST

SHA Bridge No. C-0027 **Bridge name** Double Hill Road over Watts Creek

LOCATION:
Street/Road name and number [facility carried] Double Hill Road

City/town Denton **Vicinity** X

County Caroline

This bridge projects over: Road____ **Railway**_____ **Water** X **Land** ____

Ownership: State _____ **County** X **Municipal** _____ **Other** _____

HISTORIC STATUS:
Is the bridge located within a designated historic district? Yes _____ **No** X
National Register-listed district ____ **National Register-determined-eligible district** __
Locally-designated district _____ **Other** _____

Name of district _____

BRIDGE TYPE:
Timber Bridge _____:
Beam Bridge _____ **Truss -Covered** ___ **Trestle** ____ **Timber-And-Concrete** ___

Stone Arch Bridge _____

Metal Truss Bridge _____

Movable Bridge _____:
Swing _____ **Bascule Single Leaf** __ **Bascule Multiple Leaf** _____
Vertical Lift _____ **Retractile**_____ **Pontoon** _____

Metal Girder_____:
Rolled Girder _____ **Rolled Girder Concrete Encased** _____
Plate Girder _____ **Plate Girder Concrete Encased** _____

Metal Suspension _____

Metal Arch _____

Metal Cantilever _____

Concrete X:
Concrete Arch_____ **Concrete Slab** ____ **Concrete Beam** X **Rigid Frame** _____
Other _____ **Type Name** _____

DESCRIPTION:

Setting: Urban _____ **Small town** _____ **Rural** ___X___

Describe Setting:

Bridge No. C-0027 carries Double Hill Road over Watts Creek in Caroline County. Double Hill Road runs northwest to southeast and Watts Creek flows northeast to southwest. The bridge is located in the vicinity of Denton, and is surrounded by wooded areas and some residential development.

Describe Superstructure and Substructure:

Bridge No. C-0027 is a single-span, 2-lane, concrete beam bridge. The bridge was originally built in 1913 and the structure is 34 feet, 1 inch long with a clear roadway width of 21 feet, 10 inches. The out-to-out width is 24 feet, 6 inches. The superstructure consists of five beams which support a concrete deck and concrete parapets. The beams are 18 inches wide and 33 inches deep and are spaced 5 feet, 8 inches apart. The concrete deck is 6¾ inches thick and it has a 1 foot, 6¼ inch thick bituminous wearing surface. The structure has solid panel parapets and the roadway approaches have timber posts with steel cables. The substructure consists of two, concrete abutments and two, flared concrete wingwalls. The bridge is posted for 30,000 pounds for single units and 46,000 for combination units, and it has a sufficiency rating of 59.5.

According to the 1995 inspection report (inspection conducted in February and April of 1996), this structure is in fair condition. The asphalt wearing surface is cracking along the parapets and has transverse and longitudinal cracks over the abutments. The concrete beams are moderately spalled and cracked with exposed reinforcing bars and the concrete abutments are spalled and cracked. The wingwalls have cracking and scaling at the waterline. The concrete parapets are in poor condition, as a 5 foot long section at the north end of the west parapet is broken and the west parapet cap at the south abutment is also broken. In addition, the exterior downstream face of the west parapet has a full-length crack with efflorescence at the intersection of the parapet and the concrete deck.

Discuss Major Alterations:

Bridge C-0027 has had no major alterations.

HISTORY:

WHEN was the bridge built: 1913
This date is: Actual X **Estimated** _____
Source of date: Plaque _____ **Design plans** ___ **County bridge files/inspection form** X
Other (specify):

WHY was the bridge built?

The bridge was constructed in response to the need for more efficient transportation network and increased load capacity.

WHO was the designer?

Unknown

WHO was the builder?

Unknown

WHY was the bridge altered?

N/A

Was this bridge built as part of an organized bridge-building campaign?

There is no evidence that the bridge was built as part of an organized bridge building campaign.

SURVEYOR/HISTORIAN ANALYSIS:

This bridge may have National Register significance for its association with:
A - Events _____ B- Person _____
C- Engineering/architectural character _____

The bridge does not have National Register significance.

Was the bridge constructed in response to significant events in Maryland or local history?

The earliest concrete beam bridges in the nation were deck girder spans that featured concrete slabs supported by a series of longitudinal concrete beams. This method of construction was conceptually quite similar to the traditional timber beam bridge which had found such widespread use both in Europe and in America. Developed early in the twentieth century, deck girder spans continued to be widely used in 1920 when noted bridge engineer Milo Ketchum wrote *The Design of Highway Bridges of Steel, Timber and Concrete* (Ketchum 1920).

A variation of the girder design that was developed in the first decades of the twentieth century was the continuous girder bridge, in which a single set of girders extends over several spans. By 1939, structures with spans up to 348 feet had been constructed. The design offers several advantages: it requires a smaller amount of steel and concrete, fewer bearings, and fewer expansion joints; and it reduces deflection and vibration. Disadvantages include a more complicated design and increased sensitivity to uneven settlement of foundations (Taylor et al. 1939:150).

Although visually similar to deck girder bridges, the T-beam span features a series of reinforced concrete beams that are integrated into the concrete slab, forming a monolithic mass appearing in cross section like a series of upper-case "T"s connected at the top. Thaddeus Hyatt is believed to have been the first to come upon the idea of the T-beam when he was studying reinforced concrete in the 1850s, but the first useful T-beam was developed by the Belgian Francois Hennebique at the turn of the present century (Lay 1992:293). The earliest references to T-beam bridges refer to the type as concrete slab and beam construction, a description that does not distinguish the T-beam design from the concrete deck girder. Henry G. Tyrrell was perhaps the first American bridge engineer to use the now standard term "T-beam" in his treatise *Concrete Bridges and Culverts*, published in 1909. Tyrrell commented that "it is permissible and good practice in designing small

concrete beams which are united by slabs, to consider the effect of a portion of the floor slab and to proportion the beams as T-beams" (Tyrrell 1909:186).

By 1920, reinforced concrete, T-beam construction had found broad application in standardized bridge design across the United States. In his text, *The Design of Highway Bridges of Steel, Timber and Concrete*, Milo S. Ketchum included drawings of standard T-beam spans recommended by the U.S. Bureau of Public Roads as well as drawings of T-beam bridges built by state highway departments in Ohio, Michigan, Illinois, and Massachusetts (Ketchum 1920). By the 1930s the T-beam bridge was widely built in Maryland and Virginia.

Maryland's roads and bridge improvement programs mirrored economic cycles. The first road improvement of the State Roads Commission was a 7 year program, starting with the Commissions establishment in 1908 and ending in 1915. Due to World War I, the period from 1916-1920 was one of relative inactivity; only roads of first priority were built. Truck traffic resulting from war related factories and military installations generated new, heavy traffic unanticipated by the builders of the early road system. From 1920-1929, numerous highway improvements occurred in response to the increase in Maryland motor vehicles from 103,000 in 1920 to 320,000 in 1929, with emphasis on the secondary system of feeder roads which moved traffic from the primary roads built before World War I. After World War I, Maryland's bridge system also was appraised as too narrow and structurally inadequate for the increasing traffic , with plans for an expanded bridge program to be handled by the Bridge Division, set up in 1920. In 1920 under Chapter 508 of the Acts of 1920 the State issued a bond of $3,000,000.00 for road construction; the primary purpose of these monies was to meet the state obligations involving the construction of rural post roads. The secondary purpose of these monies was to fund (with an equal sum from the counties) the building of lateral roads. the number of hard surfaced roads on the state system grew from 2000 in 1920 to 3200 in 1930. By 1930, Maryland's primary system had been inadequate to the huge freight trucks and volume of passenger cars in use, with major improvements occurring in the late 1930's. Most improvements to local roads waited until the years after World War I.

In the early years, there was a need to replace the numerous single lane timber bridges. Walter Wilson Crosby, Chief Engineer, stated in 1906, "the general plan has been to replace these [wood bridges] with pipe culverts or concrete bridges and thus forever do away with the further expense of the maintenance of expensive and dangerous wooden structures." Within a few years, readily constructed standardized bridges of concrete were being built throughout the state.

In 1933, a new set of standard plans were introduced by the State Roads Commission. This time their preparation was not announced in the Report; new standard plans were by this time nothing special - they had indeed become standard. Once again accommodating the ever-increasing demands of traffic, the roadway was increased, this time to 30 feet. The slab span's reinforcing bars remained the same diameter but were placed closer together to achieve still more load capacity.

In 1930, the roadway width for all standard plan bridges was increased to 27 feet in order to accommodate the increasing demands of automobile and truck traffic (State Roads Commission 1930). The range of span lengths remained the same, but there were some changes designed to increase the load bearing capacities. The reinforcing bars increased in thickness. Visually, the 1930 design can be distinguished from its predecessors by the pierced concrete railing that was introduced at this time.

When the bridge was built and/or given a major alteration, did it have a significant impact on the growth and development of the area?

There is no evidence that the construction of this bridge had a significant impact on the growth and development of this area.

Is the bridge located in an area which may be eligible for historic designation and would the bridge add to or detract from the historic/visual character of the potential district?

The bridge is located in an area which does not appear to be eligible for historic designation.

Is the bridge a significant example of its type?

A significant example of a concrete beam bridge should possess character-defining elements of its type, and be readily recognizable as an historic structure from the perspective of the traveler. The integrity of distinctive features visible from the roadway approach, including parapet walls or railings, is important in structures which are common examples of their type. In addition, the structure must be in excellent condition. This parapet walls of this bridge are damaged and deteriorated, including the loss of a 5 foot section of the west parapet, and therefore, Bridge C-0027 is an undistinguished example of a concrete beam bridge.

Does the bridge retain integrity of important elements described in Context Addendum?

The bridge retains much of the character-defining elements of its type, however, the integrity of these elements has been compromised by severe damage and deterioration.

Is the bridge a significant example of the work of a manufacturer, designer, and/or engineer?

This bridge is not a significant example of the work of a manufacturer, designer, and/or engineer.

Should the bridge be given further study before an evaluation of its significance is made?

No further study of this bridge is required to evaluate its significance.

BIBLIOGRAPHY:

County inspection/bridge files X **SHA inspection/bridge files** _____
Other (list):

Ketchum, Milo S.
1908 *The Design of Highway Bridges and the Calculation of Stresses in Bridge Trusses.* The Engineering News Publishing Co., New York.

1920 *The Design of Highway Bridges of Steel, Timber and Concrete.* Second edition. McGraw-Hill Book Company, New York.

Lay, Maxwell Gordon
1992 *Ways of the World: A History of the World's Roads and of the Vehicles That Used Them.* Rutgers University Press, New Brunswick, New Jersey.

CAR-299

Luten, Daniel B.
1912 Concrete Bridges. *American Concrete Institute Proceedings* 8:631-640.

1917 *Reinforced Concrete Bridges*. National Bridge Company, Indianapolis, Indiana.

Maryland State Roads Commission
1930a *Report of the State Roads Commission for the Years 1927, 1928, 1929 and 1930*. State of Maryland, State Roads Commission, Baltimore.

1930b *Standard Plans*. State of Maryland, State Roads Commission, Baltimore.

Taylor, Frederick W., Sanford E. Thompson, and Edward Smulski
1939 *Reinforced-Concrete Bridges with Formulas Applicable to Structural Steel and Concrete*. John Wiley & Sons, Inc., New York.

Tyrrell, H. Grattan
1909 *Concrete Bridges and Culverts for Both Railroads and Highways*. The Myron C. Clark Publishing Company, Chicago and New York.

SURVEYOR:

Date bridge recorded 6/24/97
Name of surveyor Caroline Hall
Organization/Address P.A.C. Spero & Co., 40 W. Chesapeake Avenue, Baltimore, MD 21204
Phone number (410) 296-1685 **FAX number** (410) 296-1670

Bridge Type Concrete Beam

Map Denton Map No. G-15

County Caroline County

Bridge #. and name C0027/ Double Hills Road over Watts Creek

CAR-299

RIVER
SUNSET DR
MARYLAND AVE
LIONS PARK
SIESTA DR
SUNDAY DR
SECOND ST
SHARP ROAD
LUPINE LANE
DENTON ELEMENTARY SCHOOL
DEEP SHORE ROAD
LEGION ROAD
DENTON SEWAGE DISPOSAL PLANT
FOY ROAD
INGERMAN AVENUE
PARK LN
LEGION ROAD
FIELD RD
MIKE ST
DOUBLE HILLS ROAD
404
313
DOUBLE HILLS ESTATES
HEERING LN
SEMMETT ROAD
LEGION ROAD
ROAD
MARTINAK STATE PARK
CAMP MARDELA
PEALIQUOR LANDING
WATTS CREEK
Herring Run
PEALIQUOR ROAD
16
CAROLINE COUNTRY CLUB
DETOUR
HIGNUTT ROAD
SHORE ROAD
HARMONY ROAD
TOWERS ROAD
MITCHELL ROAD
HIGHWAY
COUNTY 4-H CLUB PARK
WILLISTON LAKE
PENINSULA GIRL SCOUT CAMP
BEAUCHAMP ROAD
CLARK ROAD
CRANFIELD ROAD
LINE ROAD

1. CAR-299
2. DOUBLE HILL ROAD OVER WATTS CREEK
3. CAROLINE CO., MD
4. CAROLINE HALL
5. JUNE 1997
6. MD SHPO
7. SOUTHEAST VIEW OF ROADWAY APPROACH
8. 1 OF 6

1. CAR-299
2. DOUBLE HILL ROAD OVER WATTS CREEK
3 CAROLINE CO., MD
4. CAROLINE HALL
5. JUNE 1997
6 MD SHPO
7. NORTHWEST VIEW OF ROADWAY APPROACH
8. 2 OF 6

1. CAR-299
2. DOUBLE HILL ROAD OVER WATTS CREEK
3. CAROLINE CO., MD
4. CAROLINE HALL
5. JUNE 1997
6. MD SHPO
7. NORTHWEST PARAPET WALL
8. 3 OF 6

1. CAR-299
2. DOUBLE HILL ROAD OVER WATTS CREEK
3. CAROLINE CO., MD
4. CAROLINE HALL
5. JUNE 1997
6. MD SHPO
7. SOUTHEAST PARAPET WALL
8. 4 OF 6

1. CAR-299
2 DOUBLE HILL ROAD OVER WATTS CREEK
3. CAROLINE CO., MD
4. CAROLINE HALL
5. JUNE 1997
6. MD SHPO
7. SOUTHEAST DETERIORATION ON SOUTH PARAPET
8 5 OF 6

1. CAR-299
2. DOUBLE HILL ROAD OVER WATTS CREEK
3. CAROLINE CO., MD
4. CAROLINE HALL
5. JUNE 1997
6. MD SHPO
7. NORTHEAST VIEW OF NORTH PARAPET
8. 6 OF 6